TECHNOLOGY ROCKY FLATS

Demonstration & Deployment Summary

Hydrolasing Technology for the Cleanup of Radiologically Contaminated Surfaces

Summary

Since the startup of plutonium processing operations at the Rocky Flats Environmental Technology Site in 1952, nuclear material handling, processing, fabrication and waste disposal resulted in numerous spills within process areas of nuclear buildings. This resulted in radioactive contamination on floors, walls and other surfaces. Past practice was to fix the contamination with an epoxy paint. Some surfaces have had several layers of paint applied. These surfaces will require the removal of the paint down to the base material, and the decontamination of the base material before a building's structure can be demolished.

Conventional methods used in the past to remove paint and decontaminate surfaces usually involved scabbling (chipping away the first layer of the surface with a pneumatic hammer) or some form of sandblasting. Both methods create a great amount of dust and generate large quantities of waste. In addition, these methods release contamination into the air. With the hydrolase system proposed by TMR Associates, the potential for airborne contamination is significantly reduced, waste is minimized, and any contamination in the floor and wall surfaces is contained as it is removed.

The hydrolase system was tested at Building 886, a former nuclear critical mass laboratory undergoing decommissioning. This building was known to have light radioactive contamination under painted surfaces, providing an ideal setting for the project demonstration.

The Need

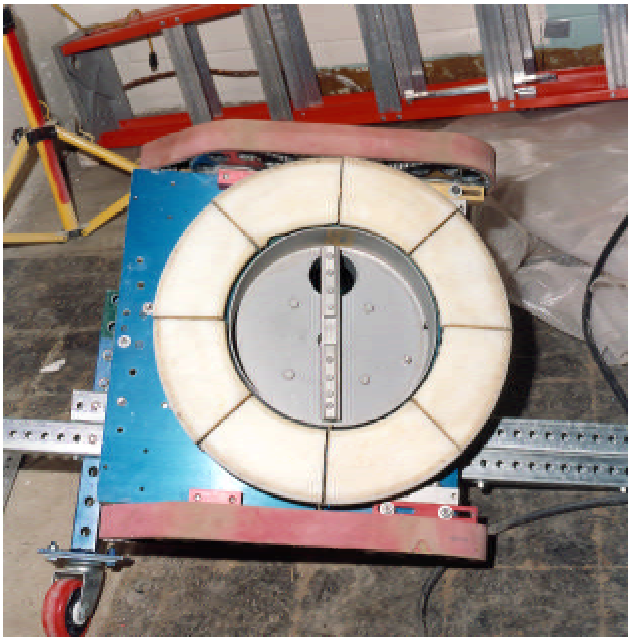
To enhance worker safety and reduce waste volumes, an improved technology was sought to strip floors and walls of paint and any underlying radioactive contamination. The desired system would be worker friendly, have the ability to work on different types of materials (concrete, masonry block, etc.), on different types of surfaces (floors, walls, ceilings), and would self-contain any waste products created by the operation.

The Technology

TMR Associates developed a hydrolasing system that blasts away paint and the initial layer of the surface material, captures the resulting water and debris, and filters this mixture to separate the water from leftover sludge for analysis and treatment or disposal. The system consists of four basic components: a pump, the hydrolasing unit, a filter and water collection tanks.

The pump is a diesel-fired, stand-alone unit fed by an ordinary hose bib at normal water pressures. The pump is operated remotely and water is transferred to the hydrolaser by high-pressure lines. The operator of the pump maintains constant radio contact with the operator of the hydrolaser in case of an emergency.

The hydrolaser itself is a compact, track-driven sled resembling a lawn mower base without wheels. Underneath the base is a round, rotating nine-inch head with six high-pressure jets capable of spray pressures up to 36,000 pounds per square inch. Offset to one side of the spray head is a port that connects to a vacuum line to remove the water and debris and pump it back to the filtering unit. The hydrolasing unit is capable of operating on floor surfaces or suspended from a boom for walls. All controls are pneumatic to eliminate the potential for electrical shock or a short that would result in equipment failure.



The underside of the hydrolaser

The water/paint/concrete solution from the hydrolasing process is pumped into a 55 gallon drum outfitted with a 75 micron filter liner to capture the majority of the solids in the solution. A gauge on the drum is used to monitor the fill rate. Operations are also stopped every 30 minutes for visual examination. The filtered water is pumped to holding tanks and the sludge that remains in the drum is analyzed to determine what, if any, treatment is required prior to disposal.

The holding tanks are five 13,000-gallon plastic tanks. Normally, one tank is filled with waste water each day. Once the water is analyzed (usually 2-3 days), the water is treated in Building 891. With the turnaround time required for sample analysis, five tanks allow for continuous operations for a one-week period.

The Project

Building 886 was chosen for the pilot project because it was known to have light radioactive contamination under painted surfaces, and it was at an opportune stage of decommissioning. The building was essentially bare and nearing the demolition phase. However, prior to demolition, several rooms and other areas required decontamination to meet radiological free release standards. Hydrolasing operations began in the building's 4,000-square-foot contaminated area in January 2002.

The Results and Benefits

The hydrolasing system had tremendous strengths in most areas. In stripping paint and underlying contaminated material the hydrolaser proved to be excellent in the majority of cases. Thicknesses of up to 3/4 inch of paint and 1/8 inch of solid concrete were removed in one pass. On masonry walls the effect was even greater, with mortar joints completely removed in some instances. The containment properties of the sled were very effective in protecting workers from the high-pressure spray and in providing an excellent vacuum seal for water and material recovery. The work area remained surprisingly dry and clean considering the volume and pressure of the spray being used.

The sludge filtering and water collection systems also proved to be very effective in separating particulates. In comparison with conventional scabbling or sandblasting methods, the hydrolase system dramatically increased worker safety while also dramatically decreasing waste.

The only drawback of the system was the inability to strip thick buildup of paint in corners and cracks or voids in the walls and floors. However, this is a common problem with all current removal systems.

For more information on hydrolasing at Rocky Flats, contact Brian Larsen (303) 966-7337, or Clay Taylor (303) 966-9771.